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SECOND SERIES VOL. X, No. 1

BULLETIN

OF

THE NEW YORK ACADEMY OF MEDICINE

INCORPORATED 1851

JANUARY, 1934

PUBLISHED MONTHLY BY

THE NEW YORK ACADEMY OF MEDICINE

2 East 103 Street

New York, N. Y.

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BULLETIN OF
THE NEW YORK
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VOL. X JANUARY, 1934 No. 1

Anniversary Discourse

MEDICINE AND MODERN SOCIOLOGICAL TRENDS

Hon. Joseph V. McKee

My subject tonight, "Medicine and Modern Sociological Trends," has given me no little concern. When I accepted Dr. Sach's invitation to address your Academy on its 87th Anniversary and I had hit upon this as the title of my discourse, I did not realize my presumptiousness until I sat down to think of the subject to which I had assigned myself.

On one hand, my contacts with medicine have been rather casual, being no greater or no less perhaps than those of the average individual who prefers to witness the indignity of his physician wielding a niblick in a sand trap, to the frightening occultism of the same gentleman manipulating a fluoroscope in the darkened recess of his consulting room. And speaking objectively, even here my interest has been academic, for while I have scrutinized the expenditure of millions of dollars for medical services, a supersensitiveness has prevented the development, so to speak, of a bedside technique.

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While I have often gone through the throes of early pneumonias, typhoids and anginas, especially after listening to physicians discuss the symptoms, I have never tarried at the sight of pain in others but have sought the solace of flight and the distraction of other things less disturbing. So, regarding the first part of my discourse, to ignorance I must add cowardice—two concepts that are of no great assistance to inspirational thought or profundity of reasoning.

Nor is my confidence restored when I turn to the second part—that of modern sociological trends. Because of the close relation of the sociological with the political, I must confess, in the words of the French, saying that "I know that I know not,"—a negative wisdom born of an experience of not too many weeks ago. However, from the more remote viewpoint of one deeply interested in human relations and the efforts of mankind for better social adjustments, I thought we might approach a consideration of these two topics in their interrelations, and from the humility of knowing not too much, point the way to some thoughts of benefit to minds busier with other things but, with all, deeply interested in the connotations of either or both of the subdivisions of our discourse.

To one who approaches the history of medicine from this viewpoint, there appears a phenomenon that recurs with surprising constancy down through the ages. This phenomenon lies in the interesting fact that the practice of medicine, more so than any other human endeavor, has moved onward under the impetus of influences outside the immediate field of medicine. In other words, it would seem to be that the great major movements in medicine have come, not from within medicine itself, but from influences outside of medicine but directly bearing upon it.

If this, my thesis, is correct, and I shall attempt tonight to give you examples of historical importance, then it is safe to assume that medicine today can be affected by those influences which are determinants of the social consciousness. Put it this way: If these influences were able to

modify the stream of medical thought in the first and the second and the third centuries, then it is a fair presumption that sociological influences can have their effect and will have their effect upon medical practice and principles of today.

With this in mind, it might be well to retrace our steps down through the corridor of the years and note, in passing, the influences, outside of medicine, that have been a tremendous factor in shaping medical achievement.

The first records of a rational or scientific medical system came from the Greeks. No nation has so excelled in pure reasoning as did the Greeks of Athenian and pre-Athenian glory. Yet, when we trace the beginnings of medicine, it was the influence of the people of Mesopotamia in their use of the entrails of animals in divination, who led the Greeks to the beginnings of a standardization of medical procedure. It was the influence, not of the Greeks, but of the submerged Minoaan civilization which gave us Aesculapius with his club and snakes, that led the way to the first ideas of sanitation and it was the Egyptians who pointed the way to the Greeks in the use of drugs and surgical instruments.

While the power of ratiocination was distinctly a flower of Greek achievement, it took the pragmatic influence of the people of Mesopotamia and Egypt to shape medical thought and practice so as to make possible the heritage of medical science to future ages. And yet, on the other hand, it was the philosophy of the Greeks which proved the impetus in the advancement of medicine, for medical science went forward with the culture of the Greeks and with the decline in that civilization, came the corresponding decline in the achievements of medicine. Hippocrates was the father of medicine but his influence was coterminus with the influence of Grecian philosophy and culture. It, therefore, is a safe premise that medicine was profoundly affected, not by medicine itself, but by those influences of thought and reason that made possible the flowering of a great intellectual age. It is interesting to note that while

Aristotle was not a physician, his power was tremendous in shaping medical thought for over two thousand years and while Galen's sway continued for thirteen centuries, it was an influence that brought no new great advancement in medical thought or science but was rather the force that bridged the centuries until the Greek influence should be reborn.

While thus we see medicine, in transmitting its Greek heritage, modified and shaped first by the empirical experience of a lower civilization and, secondly, raised to inductive and deductive reasoning by an age of philosophical ratiocination, so likewise, when we look at the story of medicine in the Roman republic, we find it again under the influence, not of philosophy, but of a military ideal which was a power tremendous in its immediate effect and incalculable in shaping the trends of later civilization.

Here was not the refining fires of a great philosophy that left in its ashes the residuum of a universal principle. Here a lower order, not that of pure reason, but of practicality, which gave an impetus that was local in its application and yet pointed to possibilities that took centuries to evaluate and develop. What would medicine have been without the influence of military exigencies? In the development of a definitive public medical service, the army that meant Rome did a service of inestimable benefit. Had it not been for the need of making the sick soldier well, the glory that was Caesar's might well have been satisfied with a sorry development of the Aesculapian Temple, the resort of the slave who in sickness sought the supplication of the Son of Apollo and Coronis and in obtaining his restoration in body, gained also his political freedom. Who can say what the story of medicine in the Roman Empire might have been were it not for the efforts of the army in building hospitals, in laying out great water works that gave the imperial city 300 million gallons of water a day, in raising standards of sanitation and establishing a medical service that saw to the appointment of physicians to towns and institutions?

In ancient Greece, it was the higher reasoning of philosophy; in Rome, the influence of an army that can fight only if it is well. And when these two great dynamic influences were dissipated in the dusk and shadows of the centuries preceding the Rennaissance, we see the almost static condition of medicine that seemed content to follow for fourteen centuries the teachings of Galen whose theories were to be dissolved into nothingness in the crucible of a newly awakened consciousness. It is a striking thing and yet a natural one that with the decadence of thought in the middle ages, when men were content to distinguish, rather than to question, medicine likewise showed its greatest poverty and moved no higher than in the concentric circles of a dialectic age.

But with the rebirth of thought, with the coming of an age that questioned even the accepted fundamentals of a satisfied civilization, we see again the outward influence working its inward way upon medicine and medical thought.

The renewal of Greek culture, which in its essence was the study of pure reason, the invention of printing, the study of art which meant the study of anatomy, the recurrence of epidemics, but most of all the tendency to question—all these, beginning in the 16th century, were outside influences that were to give a new birth to medicine and to send it winging like a moth from a chrysalis of centuries to new and unheard of heights of accomplishment.

The work of Fracastro in syphilis and typhus, de Baillon in whooping cough and rheumatism, and Sydenham in gout and measles, was the result of the twin influences of a social demand to rid a people of the dread of communal afflictions and secondly of an age that discarded the dialectic philosophy of the cloister for the stimulating questions of the alembic and the retort.

An age that turned its inquisitive eyes to the results of experimentation in the physical sciences was soon to exert an inspiring influence on the study and practice of medicine and here again we see, both subjectively and objec-

tively, a great profession growing wider and deeper in its scientific attainments because of the work done in the sister sciences of physics and chemistry.

Who can tell adequately the modification of medical thought through the work of Harvey and Boyle? Whether or not medicine claims them as its own, there is no question that the age was such in its trend toward experimenting, in its breadth of vision and its ability to assume new bases of reasoning, as to provoke a profound effect upon the leaders of medicine and made possible the opening up of new paths that today are fundamental highways of medicine. In other words, without the influence of the age, what the result? In a negative sense no one knows. At least this is true, where the influence of original thinking was absent or a great social or economic or military force was lacking, when these conditions were not present, medicine showed inertia, contentedness and a history of the commonplace.

With the coming of the 18th century, we see a new influence under whose reaction medicine moved along new paths to greater service and efficiency. This time it was not philosophical or military or the result of activity in the allied sciences. It was a new force that was to gain in momentum until it reached down into the consciousness of communities, changed their viewpoints of responsibility and led to reforms in communal activities unheard of and undreamed of. It was the gospel of social justice; the publicizing of human rights, the realization of society's obligation to the individual—it was this new concept of government that had its great reflection in public health and with it the consequent raising of standards of sanitation in the cities and towns of England. The social concepts of Jeremy Bentham brought home to the law makers of England the obligation of society to insist upon higher standards in the management of those things that affect the common health. As a result, medicine, directly and collaterally, received a great impetus in fulfilling its mission of not only restoring to health but of preventing illness. It

was a new side of medicine that since has been carried to such standards of perfection and such control that death rates have been lowered many degrees and the average life added to by some ten to fifteen years.

What about our own time? Here again within the past generation we have seen great forces at work on medicine and medical practice, so strong as to subject it to important changes—changes that do not take the years to spell out but which he who runs can read.

Here we might call it a social-economic influence. It is that principle of action that took the shoe from the shoemaker and gave him a special part of it, that took the machine from the mechanic and gave him a wheel or a driving rod or a gear to work on; that took from the artisan the objective of creative genius and made him the perfecting unit in a scheme of which he was a part but did not dominate.

Speed, mass production, mechanical inventions, these have had a profound effect upon all human endeavor and in a marked degree upon medicine and medical practice.

Where has the general practitioner gone? And why? He has been replaced by the specialist and the specialist is here because the socio-economic influence that has been at work in other fields of human endeavor has affected the practice of medicine today. Who can gainsay the benefits? Who will not admit the faults and defects? These are subjects for discussion by those better trained than I. I point them out, however, to prove my point that even today medicine is reacting to these outside influences just as medicine was deeply affected by the philosophy of Aristotle, the intellectual unrest of the 16th century, the biochemical studies of the 17th and 18th and the economic and social changes of the 18th and 19th centuries.

And now today we stand at the threshold of a new era, an era limitless in its possibilities, an era fraught with great social and political changes. We are facing new con-

cepts in human relationships that in their development will go far to break down former principles of action, sweep away age-long convictions and substitute measures of public and government control undreamed of in any scheme of modern society.

This should not occasion too great surprise. The oak is a growth of roots, hidden perhaps, but no less strong because out of sight. The changes that are taking place in social relations seem new, perhaps, but the seeds have been planted for some years past and their roots given sustenance and strength by acts, perhaps unrelated in themselves, but all tending to assist in the growth of the full-blown tree.

No great social movements occur over night. They are the results of years of iteration, of attrition of the opposition, of constant but small and undetectable movements in one direction. Then, when ready, it is the dramatic incident, or perhaps accident, that brings their larger and more complete outlines to the public consciousness.

This sociological phenomenon of the ages, even though it may not be dramatically epitomized as in the granting of Magna Charta or the beheading of Louis XVI and Marie Antoinette or the battle of Concord or the slaying of the Archduke of Austria, has its counterpart in the deep-seated and fundamental changes already taken place in the American concept of the individual's rights and responsibilities and those of his government and in the radical changes that must flow in the future from measures already put into action.

The most clearly defined lines of this present-day social movement can be found in the cost of government. In the last twenty, and more so in the last ten years, billions of dollars have been added to the public debt. Not only has the cost of local municipal government risen by leaps and bounds but also that of state and the federal government. Nor is this increase limited to any one area of the country. So great are the financial obligations of our cities and

states that by far the greater percentage of American municipalities are bankrupt and with few exceptions the others are laboring and straining to avoid defaults. It will be only by the most extreme methods, if at all, that the federal government will be able to balance its budget. The consequent burdens of taxation are becoming still heavier with their crushing weight approaching the confiscatory.

Why? In anger and irritation we censure the politician and lay the blame on his door-step, charging him with waste, corruption and extravagance. But is this altogether true? I hold no brief for any of the conditions that result from political maladministration and here I might say, parenthetically, that the American people get pretty much the kind of government they want, or at least permit to continue. But, let me here point out that in the main, government is expensive, not because of the politician, but because of the changed social attitude of the American citizen in the conduct of his communal activities through governmental agencies.

Let me give you some examples. New York City pays out over $100,000,000 a year for education. What kind of education? The same education that the children of thirty and forty years ago received? Not at all. The simple red school house, with its benches and perhaps a map or a globe for equipment, has been superseded by a plant that costs over a million dollars which contains a swimming pool, a dental clinic, a gymnasium or two, full kitchen equipment for teaching cooking, a carpentry shop, a radio and a moving picture machine. When we leave the elementary school and go into the high school, particularly the so-called technical high school, we find there a unit of education that costs from 3½ to 4 million dollars, with courses that train the pupils for employment in many varied fields of human endeavor. Or we may find a class, with special equipment, and teachers for cardiacs or the crippled or the blind.

Expensive? Certainly. But not necessarily from extravagance. Rather these are the result of the modern conception of our social obligations. They are the results of

a public determination that government, whether local, state or federal, should take over new obligations that either were not recognized before or which were left for the individual to struggle with. Fifty years ago, society felt that bad teeth were no concern of education. They were the individual's problem and whether he overcame their handicap or not mattered nothing to any one but himself. So, too, with all the other activities now correlated with education and deemed an essential part of it but which have nothing to do with spelling or arithmetic or geography.

In other words, we have undergone a changed conception of the obligations of society. Not only do we continue for a much longer period the school in loco parentis but we have placed upon it new functions and duties that formerly, if they were performed at all, were carried on by the individual and at his own expense.

Nor has this new social concept been limited to the schools. The cost of public medical service, I exclude the free service of private institutions, has in the last twenty or thirty years doubled and trebled itself. Why? Because of extravagance? I should not say so. Rather this has come again from the insistence of the people themselves, not the politicians. Old services have been improved and extended and new services instituted. Public health service has long since left the narrow confines of caring in a left-handed way for the destitute sick but each year adds to the functions that precede even the individual's birth and extend beyond his death. Slowly, but surely, the government is assuming more and more the work of the private physician and holding forth to the patient opportunities for treatment that in former years could not be obtained or if they were available, only at the patient's own expense.

Let us go farther than the field of medicine to see further evidence of this new social concept. The care of the widow and her children by government agency is very recent in its origin. The very beginnings of this responsibility assumed by society occurred just previous to my ser-

vice in the State Legislature. Yet, in the intervening years, from 1918 to 1933, the cost of caring for the widow and the deserted mother, crept from something like a million dollars to over ten millions. Why? Extravagance of the politicians? No! It was a new social concept that made government responsible first for the widow and children of the citizen, then the deserted mother, then the wife of the imprisoned husband, an ever-widening circle of new obligations. I point to these as examples of an attitude of the mind of society—that government assume in ever increasing detail and expense not merely the education of the young or the care of the sick but also the care of the family.

It is only a few years ago that the legislature decreed that the community had a new responsibility—the care of the old. The old age security act was but another step in the direction I have been speaking of: the shifting of responsibility from the individual to the government. The allowance to old people in New York City last year reached the total of over 10 million dollars. A new sociological viewpoint decreed that this was an obligation that society had toward the aged individual and one which the collective agency of government must assume for the general welfare of human kind.

I could give you many instances of this new ideal—the inspection and regulation of factories, the limitation of the hours of labor by government decree, the conditions under which men and women could work, the taking over by the government of the responsibility to see that new standards of living and labor, both in tenement and factory were invoked—all these are indicative of the great movement that marks our time—all simple in their own fields and yet being parts of a great social movement uncomprehended until the units, as in a jigsaw puzzle, are joined together in a picture that startles by its completeness.

Gradually, but steadily, we have been adding the stones to the structure, until today, amazed by the necessities of an economic crisis, we see the structure we have builded.

In a winter of discontent, when a social and economic debacle has given us the disturbing and disquieting picture of over 10 million people out of work and in want, we begin to see how far we have gone down a road untrod before in the history of this country.

With this gradual change in our social and governmental concepts, it was most natural for men, whether bankers or business men, whether producers or middlemen or farmers, to look to the ultimate of this new social tendency—the government for the solution of society's pressing problems.

Responding to this new but very real influence, the banker accepted the domination of the government. He must insure his deposits; he cannot grant interest on his accounts; he must follow closely the dictates of a bureaucratic government that gladly assumes the obligations freely thrust upon it.

The business man, unconscious of the forces of government dependence, in the hour of fading profits and demoralization of trade, gladly accepts the standard imposed by government and agrees to a collectivism that would have been scorned and combatted ten years ago.

The farmer, beside himself with debt, looks to his government for aid and receives in return a premium not for the sowing and reaping of his harvests, but because he refrains from doing so.

The workman, out of work, yet seeking to save his family, not only from humiliation but also from starvation, obtains the aid of a government that appropriates three billion dollars for public works, useful in themselves, but made necessary by the hunger of ten million people who can obtain no succor except through this recourse to government.

What do all these things signify? Their significance lies in this, if anything: For the past twenty or thirty years, we have been extending the activities of government for the solution of our social problems. Little by little, we went

down this path but with a degree of progress that has been constant and far reaching.

Now, with this great economic crisis upon us, we have turned instinctively to the government for the solution of all our troubles—social and economic. We stand today, banker and broker, business man and farmer, producer and consumer, with our arms outstretched, to the great god of government, pleading, beseeching, imploring the use of its ever-extending power for the solution of all our ills. Like the downfall of Louis XVI, we realize a revolution is upon us—not that of the serf seeking relief from the feudal lord, or the peasant of France from the salt tax or the people of America from a stupid and arrogant England, but a socially-minded nation seeking the ultimate of what has been projected as a final goal when first the tiniest obligations were shifted from the individual to the shoulders of the collected people, through the agency called government.

I am not, nor shall I be, argumentative. I am not discussing the relative merits or demerits of this new regime of society. I neither approve nor disapprove. These are questions for debate by others. I am simply trying tonight to be factual and from the facts to point not only to the road down which we have traveled but along which we must trace our steps in the immediate years to come.

If this is the modern sociological trend—to look more and more to the government for the solution of our social, our economic and our business problems, what will be the effect upon medicine and medical practice, that has shown a tendency to be most responsive to the great influences of every age, whether it be Greek or Roman, English or American?

As I see it, this new collectivism means a portentious thing for medicine. Medicine in the laboratory is one thing and perhaps as far as sociology is concerned, less subject to influences other than those of science and experimental achievement. But as far as medicine has its counterpart in communal activities, then can we expect it to be subject to

those new influences which dictate the common good and give more and more authority to government for the fulfillment of its concept of that ideal.

Will a science, so close to the common welfare and touched with this ideal of communal service, remain free from the influences that have modified education, labor, business and productive activities generally? The answer is apparent. The influence is there and strong. Will it bring about a socialization of medicine? Will men trained in medicine and surgery become agents of a super-developed state that decrees the highest standards of public health and promotes health service?

Does the future of medicine lie in being merely an agency of a government that assumes responsibility for all health conditions? In this new but gradual collectivism, where will medicine takes its stand? These are questions that are not idle. These are questions, the answers to which will affect the future of medicine as strongly and fundamentally as did the reasoning of Des Cartes or the discovery of Harvey or the specialization of the Rockefeller Institute.

It is not for us to draw a cloak over our eyes and say that this is not so or to decry conditions that already exist. For good or evil, they do exist. In the development of our civilization, these influences today are showing effects that no one who thinks can deny.

What then are we to do? It is idle to speak of the old days, which we would fain characterize as good. They have passed and it would seem forever. The appropriation of three billion dollars for unemployment or the call for the spending of millions for new services for the poor sick, the widowed and the aged, is not to be measured in money values but in the new ideal on which they are founded. We are in an era that is the result of a new concept of the obligations of society as translated into action by government.

As I see it, it is for medicine to recognize a new day in social relationship and rather than be driven to new ideals of service, to accept the leadership which should naturally

flow to it because of the great men and women who dominate its work and its destiny. Rather, I would see medicine, which down through the centuries, has been moved by outside forces and influences, assume a new leadership—not merely that of the laboratory or the clinic, the bedside or the hospital, but a leadership in thought and ideal in those fields that secondarily affect medicine and by that leadership, make medicine the protagonist of a new and great era, rather than the maid servant of those, who leading in other sociological fields, by secondary influence shape the destiny of medical practice.

If present conditions do not meet with our approval, if these tendencies are not to our liking, is it not foolish for us to withdraw to the sidelines and point the finger of scorn or disapproval? Rather, it is for those who believe in the highest ideals of medicine to participate all the more actively, not merely in medicine but in those other fields of sociology and economics and politics so that medicine may not only be a handmaiden of a civilized age but also a great factor and influence in the advancement of those things that tend properly and fundamentally toward the ultimate happiness of mankind.

The Hippocratic oath speaks of an ideal for the physician: "I will look," it says, "upon him who shall have taught me this Art as one of my parents. I will share my substance with him and I will supply him necessities if he is in need. . . . The regime I adopt shall be for the benefits of my patients according to my ability and judgment and not for their hurt and for any wrong."

This is the dedication, the consecration of the physician to the ideals of his profession. But more than that is asked of him today. With these great sociological movements under way and even at fruition, it calls on him not merely to complain, not merely to disagree, not merely to debate but to find a fuller and a freer and a greater place for medicine, not only in the curing of human ills but in the great regime to make life better and happier and nobler—to bring to humankind some of the happiness on earth that the elect expect of heaven.

ANNUAL GRADUATE FORTNIGHT
"DISORDERS OF METABOLISM"
October 23 to November 3, 1933

THE METABOLISM OF FEVER*

With Special Reference to Diabetic Hyperpyrexia

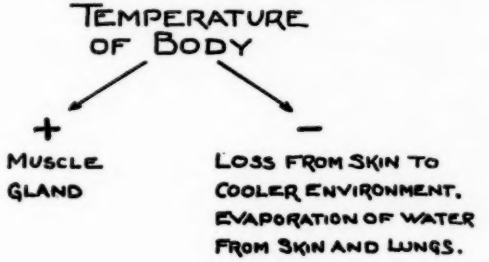
HAROLD E. HIMWICH
Yale University School of Medicine

It is a great honor to be invited to address you this evening, an honor I especially appreciate because it permits me to be on the same platform with my teacher and friend, Dr. Eugene F. DuBois. Since I am essentially a laboratory worker, your committee evidently believes that the study of medicine is advanced by laboratory experimentation as well as by observation at the bedside. Tonight, I hope to present a point of view on fever gained solely in the laboratory. The clinician will be able to test this work by bedside observation, and to modify the conception in the light of his own experience.

A description of fever may well begin with a discussion of the mechanisms for the regulation of the temperature of the body. What maintains the normal temperature at a relatively constant level? An analysis of this question reveals that certain processes tend to raise the temperature of the body, while others have the opposite effect. Most of the physiological activities of the body are attended by the production of heat; muscular exercise, for example, or the digestion of food. Indeed, the body would soon attain a temperature incompatible with life were it not for mechanisms which make for the dissipation of heat. There are two important means by which heat loss occurs. One is by radiation and conduction from the skin which is normally warmer than the environment and therefore loses heat. The other mechanism is the evaporation of water in

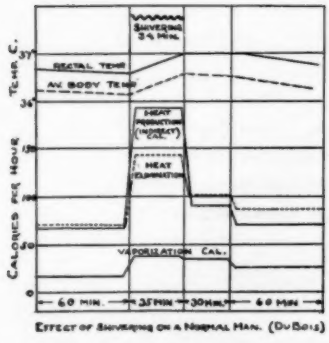
* Delivered October 23, 1933.

the form of perspiration from the skin and moisture from the lungs by which process heat is also dissipated from the body.

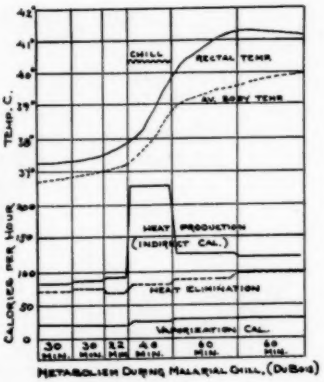


Thus, in the healthy individual, these two opposing groups of mechanisms balance each other in such fashion that the temperature remains close to 98.6° F. or 37° C. I say "close" to 98.6° because it is commonly known that there exists a diurnal variation in the temperature of the body of approximately 1.5° F., the temperature being highest in the afternoon and lowest about 12 hours later in the morning. However, except for this diurnal variation, under most normal conditions the body temperature remains remarkably constant so that marked deviations from 98.6° must be construed either as a temporarily uncompensated physiological process or as a frankly pathological change. Such a deviation indicates that the balance between heat production and heat loss has been altered. Traube (1863) in the latter half of the 19th century attempted to show that fever in every case is due to one factor only, namely, inadequate loss of heat. Traube's conception is correct only in so far that in all fevers heat loss is obviously inadequate. If the heat dissipating mechanisms eliminate sufficient heat there can be no fever. However, Traube is wrong when he says that disturbance of the mechanisms of heat loss is the only factor. In certain fevers, notably those of infectious or toxic origin, there is another very important element—the increased production of body heat. A classical study which revealed these points was made by Dr. DuBois

(1927) about ten years ago. Here are the results obtained in a patient whose heat production and elimination were measured during the course of a malarial chill.



Calorimeter experiment on a normal man, shivering in imitation of a malarial chill. After a period of sixty minutes he shivered violently for thirty-five minutes, and then remained quiet. The heat production rose sharply, the temperature scarcely rose at all. The dotted line shows heat elimination, the continued line heat production by the method of indirect calorimetry.



Malarial patient, George S., metabolism during chill.

You will note that during the chill, the heat production increased. However, despite the greater heat formation, heat elimination remained practically unchanged. As a consequence, the body temperature had to rise and you will observe it did so by about 3.5° C. When a healthy subject was placed in the calorimeter and imitated the paroxysms of the malarial patient, heat production increased to about the same extent as did that of the patient. However, the body temperature rose but ½° C. because heat elimination was correspondingly increased. These charts show clearly that during this fever heat production may increase but that the higher body temperature is due to the fact that in this instance the elimination of heat is not adequate.

II.

In order to follow the functional pathology of fever it is necessary to consider in turn each of the two previously mentioned mechanisms, heat production and heat elimination. In general, heat is produced by muscle and glands. During the malarial chill and in the muscular exercise of the healthy man the increased production of heat is due chiefly to muscular exercise and to a lesser degree to an increased glandular function. The lactic acid liberated into the blood stream by exercising muscles is absorbed by the liver, producing an increased function of that organ. Studies made by Hirsch and Müller in 1903 show convincingly that the liver is involved in the production of heat.

Pneumococcenfieber. Kaninchen 2270 gr. Temperaturanstieg.
Lufttemperatur 26° C.

This diagram represents the effect of the injection of pneumococci into a rabbit. You may note that the liver is warmer than the aortic blood, skin or the muscles. During the course of the fever there is a gradual alteration in the general relationships between the temperature of the various parts of the body. Muscle becomes somewhat hotter and there is a continuous rise in the temperature of the liver. The production of heat is a characteristic of all living matter and may occur in all the tissues of the body. This question may be summarized by saying that all viscera may be involved in the production of body heat.

Keeping in mind the two factors, heat production and heat elimination, fevers may be classified under three headings. Each of these groups has, however, one element in common, namely, inadequate elimination of heat.

Classification of Fevers

(1) With normal mechanisms for the production and elimination of heat the elimination cannot cope with the formation of heat either because the production is too rapid as in diathermy and in extreme hyperthyroidism or because of an environment too hot and humid to permit adequate loss of heat, as in sunstroke.

(2) In most infectious diseases there is a pathological conservation of heat. Heat production is increased but the elimination processes do not act as in the healthy individual for despite the greater heat production, the body acts to conserve heat. The arterioles to the skin close as though the body had been thrust into a cold bath and the cutaneous blood supply diminishes (Fremont-Smith, Morrison, Makepeace, 1929). In this manner a lesser amount of heat is lost to the environment and accordingly the body temperature rises.

(3) There is another group of fevers in which heat loss is pathologically reduced. This group of fevers is associated with anhydremia. In anhydremia the volume of the blood is diminished, particularly due to loss of water. The small amount of blood remaining in the body is employed to supply the vital organs. As a result, there is not a sufficient volume of blood to spare the usual quota for the periphery of the body. The skin becomes relatively cold and the loss of heat to the environment diminishes. Thus, even with an unchanged production of heat, the body temperature rises.

Anhydremia has been produced in infants by increasing the food intake and at the same time limiting the ingestion of fluids. Finkelstein (1908) has shown that increased carbohydrate or salt in the dietary of infants may produce fever. Bakwin (1922) has demonstrated that the inanition fever of newborn babes is associated with an increased concentration of blood serum indicating a diminution of the water content of the blood and of the body. With the administration of fluids both the concen-

tration and the temperature returned to normal. Woodyatt and his co-workers (1919) adduced striking evidence that the injection of hypertonic glucose with the resulting tremendous polyuria and consequent dehydration produces a grave hyperpyrexia. This pyrexia was cured by increasing the water content of the injected solution. Similarly, the polyuria of the diabetic patient is a potential cause of anhydremia and hyperpyrexia. Lande (1933) recently analyzed a series of cases from Mt. Sinai Hospital and called attention to the clinical importance of diabetic hyperpyrexia. He believes that this syndrome may be due, among other causes, to anhydremia.

III.

Since the term "fever" embraces such a variety of conditions, the remainder of the discussion will be confined to an experimental analysis of diabetic hyperpyrexia, which has been carried on in the Laboratory of Physiology at Yale during the last few months with the cooperation of Mr. Fazikas. The observations were made on dogs rendered completely diabetic by the previous surgical removal of the pancreas. After the pancreatectomy the animals were maintained on a diet of meat and sugar to which pancreatin was added. Insulin was injected twice daily.* When the dogs had remained in a satisfactory condition from one to two weeks, they were considered fit for experimental study.

The next step consisted in the production of the diabetic hyperpyrexia. One of the outstanding features of diabetes consists in alterations of water metabolism as indicated by the symptoms of polydipsia and polyuria. Since water occupies such an important position in the heat regulating mechanisms of the body it at once suggested itself that the polyuria of diabetes might play an important role in

* The insulin was generously supplied by Eli Lilly and Company through the courtesy of H. W. Rhodehamel, Director of Research.

the pathogenesis of diabetic hyperpyrexia. In order to imitate this polyuria which for our purposes consists chiefly of a loss of water and salt it was necessary simply to withhold insulin from the depancreatized dogs. The high blood sugar following this procedure produced a polyuria, a loss of fluids from the body. To accentuate and intensify the loss of fluids not only insulin but also water was withheld from the diabetic animals.

You may well imagine our pleasure when this simple technique resulted in the production of marked fever in our experimental animals. Indeed, it was possible to produce fever of more than 104° F. with striking ease and regularity and it is the functional pathology and clinical features of this fever which I desire to present to your attention this evening.

That the simple procedure of withholding insulin and water reduces the volume of the circulating blood can be seen in the following table. Here it will be observed that the specific gravity of the blood serum rose from 1.0251 to 1.0309 during a period of three days, while the temperature rose from 100.9 to 105.3.

TEMPERATURE AND SPECIFIC GRAVITY DURING DIABETIC HYPERPYREXIA

Water Intake	Temp. °F	Specific Gravity of Serum
Ad. Lib.	100.9	1.0251
None for 9 hours.....	102.2	1.0277
None for 24 hours.....	105.3	1.0309

The great increase in the specific gravity of the serum determined by the method of Barbour and Hamilton (1926) indicates that the water content of the blood has been correspondingly diminished—that there is an anhydremia. The specific gravity is an indicator of the amount of solids in the blood. As solids increase there is a proportional decrease in the water content. Certainly, in this experiment the anhydremia increased along with the tem-

perature. That there is an anhydremia during diabetic acidosis is well known (Chang, Harrop and Schaub, 1927-28, Peters, Kydd, and Eisenman, 1933).

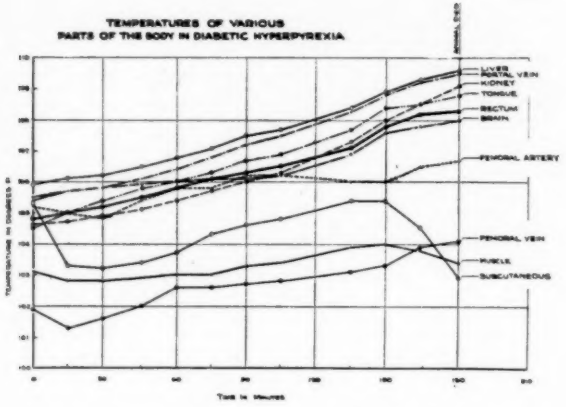
ANHYDREMIA DURING DIABETIC HYPERPYREXIA

Water Intake	Temp. °F	Sp. Gravity	Osmotic Pressure	Oxygen Capacity Vol. %
Ad. Lib.	102.4	1.0245	0.894	20.04
Ad. Lib.	99.5			
None for 30 hours	104.2	1.0315	1.149	24.83

In these observations on dog No. 10 the specific gravity increased from 1.0245 to 1.0315. The evidence for dehydration is striking but to strengthen this point further confirmation was attempted by other methods. When water is abstracted from the blood stream there may be a relative retention of salts if the salts do not leave the blood as rapidly as does the water. Since the osmotic pressure of the serum is due largely to the salts the osmotic pressure should increase with the concentration of the salts.

In this experiment the values for the osmotic pressure of the serum were determined according to the procedure of A. V. Hill (1930) by Dr. Gilman of the Department of Pharmacology. You see that the osmotic pressure rises with the increase of body temperature. As water leaves the blood the red blood cells remain and that increases the number of the red blood cells per unit volume of blood. Since the hemoglobin of the red blood cells carries oxygen, a greater oxygen capacity of the blood indicates that the relative amount of red blood cells has increased. You will note a great rise in the oxygen capacity of the blood at the height of the fever. Thus, the results of the measurements of specific gravity, osmotic pressure and oxygen capacity exhibit a perfect harmony in indicating an anhydremia. There is, therefore, a parallelism between the development of the anhydremia and the rise of the temperature of the body. This suggests that the diminution of the water reserves of the body is the causative factor of the fever exhibited by these animals.

In passing, I should like to point out that along with this increase in the specific gravity of the serum, there must be a greater viscosity of the blood. With a greater concentration of solids the blood will meet with more resistance as it passes through the vessels. The bearing of this finding on our problem will be dealt with later in this discussion.



Another characteristic of the syndrome of anhydremic hyperpyrexia is the relationship between the temperature of the mouth and the internal organs of the body to that of the skin and musculature. With Dr. Greenburg of the Department of Public Health measurements were made of the temperature of various parts of the body by means of thermocouples. Previous workers had found the liver the warmest part of the body and in anhydremic fever the same relations obtain. The various internal organs, brain, kidney, portal vein, are not very different in temperature from that of the rectum or mouth. As the rectal temperature increases all those viscera suffer a rise in temperature. The temperature of the arterial blood is somewhat lower than that of the rectum as has been observed by Wright and Johnson (1933), for the temperature of the arterial fluid is influenced by that of all parts of the body. In addition to the warm blood coming from the various viscera

there is the colder blood of the femoral vein draining the lower extremities.

In the graph, presenting the observations on an untreated diabetic animal, dog No. 3, you will note the divergence of the temperature of muscle and subcutaneous tissue just beneath the skin from that of the other organs. The muscles of the extremities and the skin form a separate group in which the temperature does not as a rule rise. These experiments indicate that the blood is kept away from the skin which otherwise would be warmer. Presently, evidence will be presented for the belief that the mechanism producing the relatively bloodless skin is that of a reflex closure of its vessels, *i. e.*, the nervous system sends impulses to the cutaneous vessels causing them to constrict. However, at this time it is sufficient to make the point that, due to the relatively cold skin, little heat is lost via that route. In a word, the fever is caused chiefly by the fact that the skin is losing an inadequate amount of heat to the environment.

The temperature usually existing in the muscles of the extremities during fever like that of the skin is in marked contrast with that of the internal organs. It is, therefore, highly probable that these muscles are relatively anemic, perhaps also as a result of the reflex closure of the arterioles. Marriott (1920) has observed that the blood flow in the extremities of anhydremic infants may be reduced from one-fifth to one-tenth that of healthy infants. Whatever the exact mechanism may be which limits the blood supply of the muscles it is therefore interesting to determine the effects of the diminished blood flow. A diminished blood flow to any organ means a reduction of its oxygen supply. In muscle inadequate oxidation is followed by the accumulation of lactic acid which finally pours into the blood stream. Therefore, if the oxygen afforded the muscles is insufficient for their needs, analyses of the blood should reveal an accumulation of lactic acid. Returning to the

observation of dog No. 10 it will be seen that lactic acid in the blood rises along with the fever.

CHANGES DURING DEVELOPMENT OF DIABETIC HYPERPYREXIA

Water Intake	Temp.	Lactic Acid	pH	Alkaline Reserve Vol. % Whole Blood	Acetone Substance
	° F.	mg. %			mg. %
Ad. Lib.	102.4	25	7.38	40.13	
Ad. Lib.	99.5				
None for 30 hours	104.2	45	7.25	32.40	2.5

LACTIC ACID OF URINE
Mg. per 24 Hours

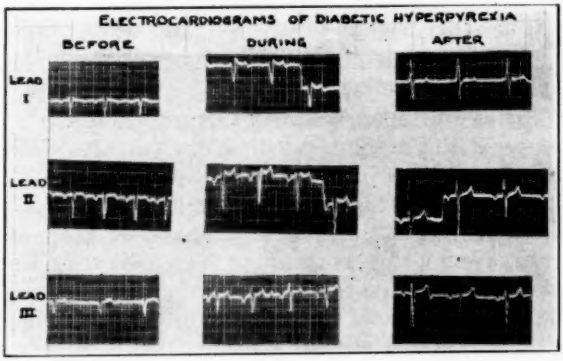
	Bisulfite Binding During Fever	Substances After Fever	Lactic Acid Excess During Fever
Dog No. 15.....	1131	180	1151
Dog No. 16.....	1929	114	1885

In 1924, Starr and Fitz noted the presence of an unknown organic acid in the urine of patients with diabetes. This unknown acid which was not comprised in the group of acetone substances was present in the urine of 10 per cent of their patients. Our observations reveal that the unknown organic acid is none other than lactic acid, for a portion of the lactic acid accumulated in the blood is excreted by the kidneys. The table discloses the increase of the lactic acid content of the urine during diabetic hyperpyrexia. In the calculation of urinary lactic acid, the bisulfite binding substances determined according to the technique of Friedemann, Cotonio and Shaffer (1927), were estimated both at the height of fever and after defer-

vescence. The excess of bisulfite binding substances occurring during fever was reckoned as lactic acid as in the work of Hewlett, Barnett and Lewis (1926-27).

It is of importance to determine the effects of lactic acid in the blood on the acid-base equilibria. The pH of the blood measured by Delafield DuBois (1932) exhibited a decrease indicating the development of an acidosis. The alkaline reserve of the blood is also diminished by the presence of lactic acid. The acid-base equilibria of the blood may be influenced by many factors, for example, the inorganic acids and bases. Determination of the total base and chloride of the serum revealed that the changes in the alkaline reserve of the whole blood may be attributed to those of lactic acid. Gesell (1918-19) noted a decrease of the alkaline reserve during the anhydremia of hemorrhage.

IV.



Since voluntary muscle exhibits evidences in diabetes of an insufficient supply of oxygen, it becomes of special interest to determine how the most important muscle of the body—namely, the heart, acts under these conditions of anhydremic hyperpyrexia. Here you see three series of

electrocardiograms of dog No. 10 taken by Dr. Nahum. The first series shows the control after pancreatectomy, before anhydremia was developed. You will note that the tracing of the S-T segment is in its usual position on the isoelectric line. The next series shows an electrocardiogram taken during an anhydremic fever of 104.2°. Here the tracing of the S-T segment shows a shift to a position well above that of the isoelectric line. The usual significance of such a change is insufficient oxygenation of the heart itself. Ischemia of the heart may occur in any condition in which the cardiac musculature receives an insufficient supply of oxygen, for example in arteriosclerosis, coronary thrombosis or asphyxia. The mechanism which produces this change is a matter of conjecture. Since the heart is one of the vital organs of the body it is difficult to believe that a reflex to its coronary vessels would be employed to limit the blood flow, though such might possibly be the case. Perhaps the great increase in the viscosity of the blood might be a factor, for with an increased viscosity the blood may pass through the smaller vessels so slowly as to make it impossible to deliver an adequate amount of oxygen in a given time. It is not likely to be due to a greatly diminished blood pressure since the animal showed no indication of shock. On the contrary, it was lively and jumped out of its cage. Without further studies, we cannot be sure of the mechanism of causation. However, in any case, the changes in the electrocardiogram are identical with those occurring during oxygen lack of the heart —a functional asphyxia. These changes of the electrocardiogram are not the result of the increased temperature *per se*, but of the anhydremia. Nevertheless, it is not impossible that alterations in the heart other than those of asphyxia may have a similar effect on the electrocardiogram. It is significant, however, that electrocardiograms of anhydremic children taken by McCulloch (1920) revealed the same changes of the S-T segment.

Let us now see the complete picture. As a result of dehydration due to withholding of fluids and to polyuria in a diabetic animal, there is a diminution of blood volume

V.

Decreased Blood Volume or Anhydremia	Decrease in Blood Supply to Skin → Hyperpyrexia
	Decrease in Blood Supply to Muscle → Lactic Acid
	Changes in E.K.G. similar to those of insufficient oxygen supply to heart

and of body fluids. Evidence of this is found in the increased specific gravity, osmotic pressure and oxygen capacity of the blood. Due to the diminished water content of the body, a characteristic syndrome develops in which may be included changes of temperature, lactic acid and of the heart. The temperature of the vital organs does not fall; on the contrary, it rises because of insufficient heat loss through the skin and lungs. There is not a sufficient volume of blood for circulation through the skin which, therefore, becomes relatively cold. As a result of the diminished output of heat from the skin, hyperpyrexia develops, because of the inadequate supply of blood to muscle the oxygen afforded is insufficient and lactic acid accumulates. The electrocardiogram also yields evidence which may be interpreted as indicating oxygen lack in the heart.

VI.

If the picture of diabetic hyperpyrexia just drawn be a true one and the proposed explanation be correct, the successful application of one single test should serve to confirm it. The administration of water should restore all the changes characteristic of this syndrome to their original status, and at the time preserve the life of the animal. This, in fact, has been achieved by intravenous injection and oral ingestion of fluids, and it has been found possible to save life by initiating these simple procedures, even at a body temperature of 105.5° F.

CHANGES DURING DEVELOPMENT AND REGRESSION OF DIABETIC HYPERPYREXIA

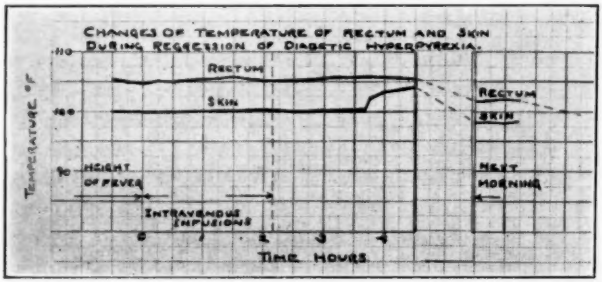
Water Intake	Temp. °F	Sp. Gravity	Osmotic Pressure	Oxygen Capacity Vol. %
Ad. Lib.	102.4	1.0245	0.894	20.04
None for 30 hours..	104.2	1.0315	1.149	24.83
700 c.c. in 3 hours..	102.2	1.0254	1.099	20.69
1000 c.c. in 10 hours	100.4	1.0246	1.016	19.58
Ad. Lib. for 26 hours	99.5	1.0234	0.876	19.74

The first part of these data you have seen before. It was presented to show some of the blood changes during the development of the diabetic hyperpyrexia. When the temperature attained the value of 104.2° F. fluids were administered by mouth and insulin was injected subcutaneously. In approximately four hours the body temperature had fallen almost 4° F. Very striking is the agreement between the rise and fall of the temperature and the changes in the water content of the blood. The changes in specific gravity, osmotic pressure, and oxygen capacity all show first, a great diminution in the water content of the blood and during the cure a reversal to normal values. The specific gravity falls from 1.0315 at the height of the fever to 1.0234; the osmotic pressure from 1.149 to 00.876 and the oxygen capacity from 24.83 vol. per cent to 19.74 vol. per cent. There can be no doubt of the close correlation between the water content of the blood and the temperature of the diabetic animal.

CHANGES DURING DEVELOPMENT AND REGRESSION OF DIABETIC HYPERPYREXIA

Water Intake	Temp. °F	Lactic Acid mg. %	pH	Alkaline Reserve Vol. % Whole Blood	Acetone Substance mg. %
Ad. Lib.	102.4	25	7.38	40.13	
None for 15 hours..	104.2	45	7.25	32.40	2.5
1150 c.c. for 30 hours	102.2	70	7.18	32.32	0
1000 c.c. for 10 hours	100.8	16	7.29	37.92	4.2
Ad. Lib. 26 hours...	99.5	17	7.35	37.99	

The other changes in the blood exhibit a similar advance and regression. Twenty-five mg. per cent of lactic acid is somewhat high for a normal value. Forty-five mg. per cent is one that is definitely increased. The rise to 70 mg. per cent may well be attributed to the washing out of the lactic acid accumulated in muscle once the normal blood flow had been reestablished. Finally, lactic acid returns to a normal value. The pH is affected by the concentration of lactic acid and the pH of the blood indicates that an acidosis developed with the accumulation of lactic acid, and decreased when the lactic acid was removed. The changes in the alkaline reserve are also largely determined by those of lactic acid. As the lactic acid content of the blood rose from 25 mg. per cent to 45 mg. per cent the alkaline reserve diminished from 40.13 to 32.40 vols. per cent. The further increase of lactic acid to 70 mg. per cent was followed by no greater fall of the alkaline reserve probably because the fluids administered at this time contained base in the form both of chloride and bicarbonate. Again the acetone substances do not appear to affect the alkaline reserve to a noticeable degree.



The temperature of the various parts of the body, especially of the rectum and skin exhibit an interesting series of changes. Here are the results obtained on dog No. 3 in which treatment was instituted after the temperature had mounted to 105.5°. At this point the animal was put under

amytal anaesthesia and one thermocouple was inserted in the rectum and another placed on the skin. These registered automatically and you will note that the skin temperature was approximately 100° and the rectum 105.5°. After the initial readings had been made fluids were administered intravenously. One liter was given during a period of approximately 2 hours. For more than 1½ hours following the infusion there was no marked change either in the skin temperature or in the rectal temperature. Then suddenly the skin temperature began to rise, as if the arterioles of the skin had opened, and had permitted more blood to enter the cutaneous area. The skin temperature rose almost to 104.0° F. and the rectal temperature nevertheless remained the same for some time longer. The next morning, however, both skin and rectal temperature had diminished. Sufficient heat had been lost by the skin to reduce the skin temperature to 98.5° F. and that of the rectum to 101.5° F. At this time the animal recovered from the amytal anaesthesia; therefore, the succeeding observations were made with a mercury thermometer until the rectal temperature fell to 99.5° F. Thus the rectal temperature decreased only after heat was lost by the skin. In other words, the body must bring blood to the periphery to lose heat. If you recall the temperature relations while the fever was advancing you will remember that the skin decreased in temperature as the rectal temperature rose. There is, therefore, an inverse ratio between skin and rectal temperature. The skin temperature decreases as the rectal approaches a maximum while in recovery from fever the skin temperature rises before the rectal temperature is able to fall. The fact that in the experiment on dog No. 3 the skin temperature did not change for some time after the intravenous infusion of fluids had been administered would indicate that the arterioles to the skin were shut at first and did not permit blood to enter the cutaneous vessels. Such an action would lend evidence for the point of view that the skin was kept in its relatively bloodless condition as a result of a reflex closure of its smaller vessels which later were relaxed only some time after the

fluid content of the body had been increased. We believe that the same mechanism obtains in the musculature of the extremities since the muscles, like the skin, are also relatively cold during the development of the fever. At this time we do not wish to commit ourselves as to the mechanism causing the changes in the heart. However, it is of great interest and importance to note that these changes of the electrocardiogram also regress with the administration of fluids. The effect of a fever of 104.2° in the S-T segment may be seen in the figure. Within 48 hours of the ingestion of fluids there is a marked change—the S-T segment is lowered to the isoelectric line, and in 24 hours the electrocardiogram is indistinguishable from the original control.

It has thus been possible to trace the regression of all the changes attendant upon the development of diabetic hyperpyrexia simply as a result of the ingestion of fluids. This affords striking evidence for the belief that lack of water is the prime factor in the production of this syndrome.

VII.

It is obviously of some importance to make a similar study of diabetic hyperpyrexia in human patients. Suggestive is the work of Hartmann and Darrow (1928) who noted an increased concentration of lactic acid in the blood of some of their patients. I am not aware of any observations made with the electrocardiograph.

It is not always practical to make the various laboratory tests necessary for the demonstration of anhydremia. Of great aid in establishing the diagnosis, however, is a history of polyuria, vomiting and limited fluid intake. These are suggestive of anhydremia in a patient with diabetes and fever. Moreover, the patient may exhibit such definite signs of anhydremia as those of dry tissues and soft eye balls. It is of some advantage to know that the anhydremia is roughly proportional to the fever. Until the fever subsides the water content of the tissues may be considered inadequate. If no other cause for the fever can be found, then the extent of the fever may be taken as an indication of the degree of anhydremia.

EFFECT OF WATER ON DIABETIC HYPERPYREXIA
NO INSULIN WAS INJECTED DURING FEVER

Water	Temp. °F	Blood Sugar mg. %	Sp. Gravity	Lactic Acid mg. %
Ad. Lib.	100.6	258	1.0248	22
None for 24 hours.....	104.5	490	1.0275	54
1½ liters 3 hours.....	99.3	520	1.0227	42
Ad. Lib. 24 hours.....	100.0	360	1.0213	25

A sharp differentiation must be made between the therapeutic effects of insulin and those of fluids. The injection of insulin is effective in diminishing blood sugar and the acetone substances, but only the entrance of fluids into the body can produce a defervescence of the fever, a reduction of the acidosis due to the accumulation of lactic acid and a regression of the changes of the heart noted in the electrocardiogram. In the following observations of an animal with diabetic hyperpyrexia no insulin was injected in order to be able to follow more clearly the effects of the administration of water. Most striking is the regression of the fever, which occurred despite some increase of the blood sugar. The diminution of the specific gravity indicates that the dilution of the blood however was in proportion to the fall in temperature. After the ingestion of water the concentration of lactic acid decreased and the S-T segment of the electrocardiogram also returned to the original normal formation. Thus in diabetic hyperpyrexia the therapeusis consists essentially of increasing the water content of the tissues.

When water is administered intravenously or subcutaneously, it may be given as a 0.9 per cent solution of sodium chloride, isotonic with the body fluids. Some observers advocate sodium bicarbonate for intravenous medication. Sodium bicarbonate, however, in large amounts carries with it the counter-indication of producing an alkalosis. In some of our experiments a solution proposed by Dr. Darrow (Cunningham and Darrow, 1931) was employed:

NaCl ..... 6 gm. per liter
$NaHCO_3$ ..... 2.5 gm. per liter
KCl .....0.45 gm. per liter

This solution possesses the advantage of containing sodium chloride and sodium bicarbonate in approximately the same proportions in which they exist in the body fluids. The presence of sodium bicarbonate lends, perhaps, special virtue to this solution since it aids directly in overcoming the acidosis which occurs so frequently in diabetic hyperpyrexia.

In the foregoing discussion we have reviewed the production in dogs of a syndrome closely resembling the diabetic hyperpyrexia of human patients. Certain signs have been found which may next be sought for in the human patients. The underlying mechanism in the development of the syndrome is the polyuria which causes an anhydremia and the anhydremia is the direct etiological factor producing the hyperpyrexia. Thus, the functional pathology indicates an insufficient volume of water in the tissues and therefore the effective means of treatment of the condition consist in increasing the water content of the body.

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PROCEEDINGS OF ACADEMY MEETINGS

DECEMBER

STATED MEETINGS

Thursday Evening, December 7

ORDER

I. Executive Session at 8:30 o'clock

a. Reading of the Minutes

b. Election of Academy Officers

c. Election of Fellows and Members

II. The Anniversary Discourse at 8:45 o'clock

"Medicine and modern sociological trends," Hon. Joseph V. McKee.

Thursday Evening, December 14, at 8:30 o'clock

The Third Harvey Lecture, "Heteroplastic Grafting in Embryology," Professor Ross G. Harrison, Sterling Professor Biology, Yale University.

This lecture takes the place of the second Stated Meeting of the Academy for December.

SECTION MEETINGS

Joint Meeting

Section of Surgery and the Section of Medicine

Friday Evening, December 1, at 8:30 o'clock

I. Reading of the Minutes

II. Presentation of Cases

a. Thyrocardiac disturbances—2 cases, Arthur S. McQuillan

b. Thyrocardiac disturbances—2 cases, Emil Goetsch

III. Papers of the Evening

a. The medical treatment of the thyrocardiac, Cary Eggleston

b. The operative treatment of the thyrocardiac, William Barclay Parsons

IV. General Discussion

Malcolm Goodridge, Stuart Hart, Richard Lewisohn, Morris K. Smith

Section of Dermatology and Syphilology

Tuesday Evening, December 5, at 8:30 o'clock

ORDER

I. Presentation of Cases from New York University and Bellevue Hospital Medical College

II. Presentation of Miscellaneous Cases

III. Discussion of Selected Cases

Section of Neurology and Psychiatry

Tuesday Evening, December 12, at 8:30 o'clock

ORDER

I. Reading of the Minutes

II. Papers of the Evening

a. Delinquency problems in a children's court, Helen Montague (by invitation)

b. Evaluation of classification in prisons, J. L. McCartney, Elmira (by invitation)

c. Modern treatment of crime, V. C. Branham, Albany

III. Discussion

Bernard Sachs, Judge Jonah B. Goldstein (by invitation), Menas S. Gregory, Henrietta Additon, Deputy Commissioner (by invitation), Bernard Glueck (by invitation)

IV. Executive Session

Section of Pediatrics

Thursday Evening, December 14, at 8:30 o'clock

ORDER

I. Papers of the Evening

a. Serum phosphatase as a criterion of the severity and of the rate of healing of rickets, Aaron Bodansky (by invitation), Henry L. Jaffe (Hospital for Joint Diseases)

b. Serum protein deficiency without reversal of the albumin: globulin ratio, A. A. Weech (by invitation) (Babies' Hospital)

c. Studies in measles prophylaxis, Bela Schick, Samuel Karelitz (Mount Sinai Hospital)

d. Variations in serum bases of infants and children in disease, Aubrey B. MacLean, Ruth C. Sullivan (by invitation) (St. Vincent's Hospital)

e. Studies in amyloidosis, Harold G. Grayzel (by invitation), Mendel Jacobi, Hyman Warshall (by invitation), Maxwell Bogin (by invitation), Herman Bolker (by invitation), Benjamin Kramer (The Jewish Hospital of Brooklyn)

SECTION OF ORTHOPEDIC SURGERY

Friday Evening, December 15, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PRESENTATION OF CASES

a. Correction of equinus deformity of os calcis in congenital club foot, Leo Mayer

b. Demonstration of Schultze osteoclast for correction of congenital club foot, Nicholas Ransohoff

c. Cases showing early and complete correction of equinus in congenital club foot, John C. McCauley, Jr. (by invitation)

III. PAPER OF THE EVENING

Treatment of congenital club foot, J. H. Kite, Decatur, Georgia (by invitation)

IV. DISCUSSION

Percy W. Roberts, John J. Nutt, Isadore Zadek, Arthur Krida

JOINT MEETING

SECTION OF MEDICINE AND THE SECTION OF OPHTHALMOLOGY

Tuesday Evening, December 19, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PAPERS OF THE EVENING

a. The ocular complications found in the study of 2000 diabetic patients (Dr. Joslin's patients), J. Herbert Waite, Boston (by invitation)

b. The ocular complications of diabetes, Russell M. Wilder, Mayo Clinic (by invitation)

III. General Discussion

Elliott P. Joslin, Boston (by invitation), John Wheeler, Arthur J. Bedell, Albany, Bernard Samuels

Special Notice

Section of Ophthalmology

Monday Evening, December 18, at 7 o'clock

Instruction Hour was carried on as usual: External Diseases—Symptomology, Pathology and Treatment, Dr. Algernon B. Reese

Section of Obstetrics and Gynecology

Program arranged by the Obstetrical Staff of the Knickerbocker Hospital

Tuesday Evening, December 19, at 8:30 o'clock

ORDER

I. Reading of the Minutes

II. Presentation of Cases

a. Puerperal Parotitis—2 cases, Mortimer W. Rodgers

b. Siamese Twins—caesarian section—hysterectomy, George G. Bemis (by invitation)
Discussion—Leon T. LeWald, George L. Brodhead, Arthur Stein

c. Placenta Acreta, Edwin G. Langrock
Discussion—Locke L. Mackenzie, Meyer R. Robinson

d. Spontaneous rupture at the cervico-vaginal junction during labor at term, Ralph L. Barrett (by invitation)
Discussion—Samuel J. Scadron, Edwin W. Holladay, George L. Brodhead, Arthur Stein

III. Paper of the Evening

A statistical study of six years' work in the Maternity Service at the Knickerbocker Hospital (lantern slides), George L. Brodhead, R. H. Shrady (by invitation)
Discussion—Edwin W. Holladay, George L. Brodhead

Section of Otolaryngology

Wednesday Evening, December 20, at 8:30 o'clock

ORDER

I. Reading of the Minutes

II. Presentation of Cases

a. Osteomyelitis of the skull following acute sinus infection, with intracranial complications, Hampton P. Howell (by invitation), Howard A. Patterson

b. Two cases of osteomyelitis of the skull following sinusitis and orbital cellulitis, C. C. Wolcott (by invitation)

III. PAPERS OF THE EVENING

a. The regression theory of otosclerosis, Louis K. Guggenheim, St. Louis (by invitation)
Discussion opened by Arthur B. Duel, Edmund P. Fowler

b. Osteomyelitis of the skull, A. C. Furstenburg, University of Michigan (by invitation)
Discussion opened by Ira Cohen, Robert E. Buckley, Rudolph Kramer, Harmon Smith

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, December 20, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PAPERS OF THE EVENING

a. Some of the neglected affections and lesions of the deep urethra in the male, Edgar G. Ballenger, Atlanta, Georgia (by invitation)
Discussion opened by Howard S. Jeck.

NEW YORK ROENTGEN SOCIETY

in affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Monday Evening, December 18, at 8:00 o'clock

I. 8:00 to 8:30 p. m.
Demonstration and discussion of interesting cases

II. 8:30 p. m.
Clinical Meeting. Members demonstrated films of cases in which the diagnoses have been proved by operation, autopsy or therapeutic response.

NEW YORK MEETING OF THE

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Wednesday Evening, December 20, at 8:15 o'clock

I. Experimental evidence of an additional substance essential to mammalian nutrition, L. N. Ellis; introduced by H. C. Sherman

II. Clinical use of prolactin, R. Kurzrok, R. W. Bates, O. Riddle, E. G. Miller

III. Effect of barbiturates in experimental nephrosis, W. S. Murphy, T. Koppanyi

IV. Metabolism of various sulfur compounds in cystinuria, E. Brand, G. F. Cahill, M. M. Harris

V. Reaction of transplantable and spontaneous tumors to blood-carried bacterial toxins in animals unsusceptible to Schwartzman phenomenon, F. Duran-Reynals, introduced by J. B. Murphy

VI. A contribution to the etiology of encephalitis. Differentiation of encephalitis by protection test, L. T. Webster, G. L. Fite

VII. Experimental poliomyelitis. Active immunization with neutralized mixtures of virus and serum, S. D. Kramer, M. Schaeffer, introduced by A. J. Goldforb

VIII. On the motility of the colon of the dog, T. S. Raiford, M. G. Mulinos

NEW YORK PATHOLOGICAL SOCIETY

in affilition with

THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, December 28, at 8:30 o'clock

ORDER

I. Demonstration of Pathological Specimens

II. Papers of the Evening

a. Blood groups and therapeutic malaria, Silik H. Polayes, Irving M. Derby (by invitation)

b. A case of non-lipoid histiocytosis, with necropsy, Nathan Chandler Foot, Charles M. Olcott

c. The histopathology of Paget's disease, Vera D. Dolgopol

d. The pigmented mole as a tactile organ; its place in the evolution of hair follicles, George F. Laidlaw, Margaret R. Murray (by invitation)

RECENT ACCESSIONS TO THE LIBRARY

Bigelow, G. H. & Lombard, H. L. Cancer and other chronic diseases in Massachusetts.
Boston, Houghton, 1933, 355 p.

Burnet, É. Prophylaxie de la tuberculose; applications en Europe.
Paris, Masson, 1933, 375 p.

Clendening, L. Behind the doctor
N. Y., Knopf, 1933, 458 p.

Cottet, J. Les troubles de l'élimination urinaire de l'eau.
Paris, Masson, 1933, 211 p.

Dietlen, H. Die Lungentuberkulose; eine Einführung in ihre Entstehung, ihre Entwicklung und ihre Verlaufsarten.
Dresden, Steinkopff, 1934 [1933], 142 p.

Földes, E. A new approach to dietetic therapy.
Boston, Badger, [1933], 434 p.

Gershenfeld, L. Urine and urinalysis.
Phil., Lea, 1933, 272 p.

Glyn-Jones, H. The pharmacy and poisons act, 1933, explained.
London, Eyre, 1933, 117 p.

Harris, H. A. Bone growth in health and disease.
London, Milford, 1933, 248 p.

Hertzler, A. E. Surgical pathology of the mammary gland.
Phil., Lippincott, [1933], 283 p.

Hertzler, A. E. The technic of local anesthesia. 5. ed.
St. Louis, Mosby, 1933, 292 p.

Ischlondsky, N. E. Sécrétion interne et régénérescence.
Paris, Doin, 1933, 336 p.

Kerr, J. M. M. Maternal mortality and morbidity.
Edin., Livingstone, 1933, 382 p.

Kerr, J. M. M.; Ferguson, J. H.; Young, J. [et al.]. Combined text-book of obstetrics and gynaecology. 2. ed.
Edin., Livingstone, 1933, 1100 p.

Mead, S. V. Oral surgery.
St. Louis, Mosby, 1933, 1087 p.

Meyer, H. H. & Gottlieb, R. Die experimentelle Pharmakologie als Grundlage der Arzneibehandlung. 8. Aufl.
Berlin, Urban, 1933, 813 p.

New York Academy of Medicine. Committee on Public Health Relations. Maternal mortality in New York City.
N. Y., Commonwealth Fund, 1933, 290 p.

Physiological health. Edited by J. B. Nash.
N. Y., Barnes, 1933, 308 p.

Rabinowitch, I. M. Diabetes mellitus.
Toronto, Macmillan, 1933, 246 p.

Rosett, J. Intercortical systems of the human cerebrum.
N. Y., Columbia Univ. Pr., 1933, 135 p.

Rypins, H. L. Medical state board examinations.
Phil., Lippincott, [1933], 448 p.

Stuhr, E. T. Manual of Pacific coast drug plants.
[Lancaster, Pa., Science Press], 1933, 189 p.

Sutherland, H. G. The arches of the years.
N. Y., Morrow, 1933, 293 p.

Topley, W. W. C. An outline of immunity.
London, Arnold, 1933, 415 p.

United States. Department of Commerce. Bureau of the census. Manual of joint causes of death. 3. ed.
Wash., U. S. Gov. Pr. Off., 1933, 255 p.

Weihofen, H. Insanity as a defense in criminal law.
N. Y., Commonwealth Fund, 1933, 524 p.

Wilkinson, W. C. Tuberculin, its vindication by technique.
London, Churchill, 1933, 93 p.

RECENT ACTION OF THE COUNCIL REGARDING FEE-SPLITTING

At a regular meeting of the Council held on December 13, 1933, the following action was taken:

"It was moved and duly carried that the Council authorizes the sending of a statement to each Fellow and Member calling attention to the ruling of the Council regarding fee-splitting and asking that careful attention be paid in this regard to any candidates whom they may endorse for the consideration of the Committee on Admission."

The Council now wishes to reaffirm its stand taken when it addressed to the Fellowship of the Academy on November 17, 1930, a letter reendorsing the Academy's adoption of the following resolutions of May 24, 1911:

"RESOLVED that the secret division of a fee, or fees, with any person, or persons, who may be instrumental in influencing a patient, or patients, to apply for operative care or professional advice, is unworthy of any member of the medical profession.

"RESOLVED that if such a division of fee is made by a member of The New York Academy of Medicine, it should be counted as of sufficient ground for the expulsion of the member.

"RESOLVED that the Council considers it its duty to investigate charges against members made on the basis of such division of fee, and on receipt of proof of offense the Council may either permit the resignation of the person or expel* him from the Academy."

Very sincerely yours,

FOSTER KENNEDY, *Recording Secretary*

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* The present Constitution of the Academy provides that the Council may only recommend expulsion to the membership.

FELLOWS AND MEMBERS ELECTED DECEMBER 7, 1933

For Fellowship:

Edward A. Atwood ..... 360 Park Avenue, Paterson, N. J.
Theodore Neustaedter ..... 27 East 93 Street
E. Gordon Stoloff ..... 1085 Park Avenue
George Thomas Pack ..... 155 East 72 Street
Harold Abramson ..... 1097 Madison Avenue
Nicholas J. Poltchaninoff ..... 35 Nathan Davis Place
William Clifford Ivins ..... 214 East Hanover Street, Trenton, N. J.
William Beverly White ..... 65 South Street, Stamford, Conn.

For Membership:

Alfred A. Schwartz ..... 7 West 71 Street

For Associates:

Robert Morris Fischer, D.D.S. ..... 73 East 90 Street
Jerome M. Schweitzer, D.D.S. ..... 643 West 246 Street
Marjorie T. Bellows, A.B. ..... 9 Greenridge Avenue, White Plains

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ALFRED FABIAN HESS

The Council of The New York Academy of Medicine expresses its profound sorrow over the death of its distinguished member, Dr. Alfred Fabian Hess.

His work has been of such signal importance in the development of American medicine, that the Academy is proud to have had among its members a man who has left behind him the reputation of having been not only a great physician, a distinguished pediatrist, an original investigator, but one who may truly be called a benefactor of mankind.

During his brief career he has earned the gratitude of the medical world, both here and abroad. As President of the Harvey Society, his leadership was characterized by an unusual devotion to, and respect for, pure and exact science. The resolutions passed by the Harvey Society include so fine a summary of his achievements, that the

Academy is ready to adopt these resolutions as an expression of its own sentiments regarding Dr. Alfred Fabian Hess.

BERNARD SACHS, *President.*

The Harvey Society learns with profound regret of the death of the distinguished President of the Society, Alfred Fabian Hess. In the lengthening list of its Presidents, none has been more devoted to its interests, none has sought more earnestly to maintain its fame, none has devoted more energy to the realization of its purposes. He exhibited his sympathetic attitude by consenting to return to a former custom of the Society to occupy his office for two successive terms. In the second of these, unexpectedly and in the full tide of his powers, his grievous loss is sustained. He has been a member since 1911 and has himself been one of its lecturers (Jan. 15, 1921).

Doctor Hess has numerous claims to the high regard of his professional colleagues. Beyond the custom of most men, his life was given solely to the interests of his calling. He knew no divided allegiance; the whole of his thought and energy exhibited extraordinary singleness of purpose. A life of contented leisure, so easily within his choice, he exchanged by preference for one of laborious days. These he consecrated to the furtherance of useful knowledge and this he placed unreservedly at the disposal of his fellow men. Two books and 225 separate contributions to journals are witness to this choice and serve as his fitting memorial.

His researches fall into two categories. There is an earlier one in which his activities were dominated by the prevailing interest in communicable diseases. His thought took, as it usually did, two directions, one social, one scientific. Problems connected with the spread of tuberculosis engaged his attention first. In the Laboratories of the Department of Health in this city he studied "The Incidence of Tubercle Bacilli in New York City Milk" (1909), an investigation which led to important recommendations for the protection, especially of infants, from infected milk. The concern which he entertained for the welfare of chil-

dren led him to suggest a plan for the institutional treatment of infants exposed to this scourge. To this end he developed the idea of "A Tuberculosis Preventorium for Infants" (1917) which led then to the realization of a Preventorium for Infants at Farmingdale (N. J.). At this period he was interested also in certain phases of other communicable diseases. In writing on "A Protective Therapy for Mumps" (1915) he discerned in the method he was proposing a solution not merely of special importance but one—and this was eminently characteristic of the penetrating quality of his reflective nature—involving a general principle, applicable to the treatment of measles and since then tested in relation to other comparable diseases.

Although he retained his interest in communicable diseases, he soon turned, at the Laboratories of the Board of Health and later in the Home for Hebrew Children and the laboratories of the College of Physicians and Surgeons at Columbia University to his studies on scurvy and on rickets. Investigations on these subjects he continued to pursue with unflagging energy throughout his life. It was this field to which his main and outstanding contributions to knowledge were made. At the time of his death he was engaged in analyzing no less than six separate aspects of these problems. How extraordinarily fruitful these researches were, it is perhaps too early completely to appreciate. In number alone, their wealth bears witness to his very great industry. But meritorious in itself, industry alone would not have achieved for him his well earned fame. In more than one direction he broke new paths. The subject is so well known as to require no extended description—the relation of scurvy and rickets to the vitamins, the influence of sunlight and the seasons on the progress of the disease rickets, the importance in its treatment, of artificial light, of various foods, and of various oils, the development of non-potent into potent agents when exposed to ultra-violet rays. In these researches his prime endeavor was to extend knowledge, but his critical intelligence was content with nothing less than that pitfalls due to too early

generalization should be avoided; anti-rachitic agents he saw were not of equal value, for they exhibit differences depending on their origin and on their utilization. And in this case as in that of tuberculosis he did not lose sight of the wider prophylactic uses to which his investigations could be put; he saw to it that the general public benefitted by making practical underlying theoretical considerations.

The method by which he carried on his activities is not the least of the interesting phenomena which distinguish the ways of this gifted man. Having entertained an idea —and he had many—he tested it, first rationally, with the utmost meticulousness. He defined it carefully in words so that by observation and experiment he was in position to know precisely what it was which he wished to subject to exact analysis. Having analyzed it, he was not content unless an experiment, which to him was never more than an analogue, was genuinely illustrative of a clinical situation. If he found a solution to an initial question, he proceeded to further development or elaboration of the plan originally entertained. It was an impressive intellectual process, slow and careful procedure from step to step, which those who knew him came to appreciate and which those who knew him less intimately did not in the end escape from recognizing.

How devoted he was to the acquisition of knowledge, quite apart from its meaning for his personal career, can be discerned from a further study of his technique. His investigations forced upon him the need to rely upon methods, both chemical and physical, with which his own education and later training, had not prepared him. From the challenge of their use he did not shrink. In principle, and for his purposes, he developed a sure acquaintance with their significance. But from a personal technical utilization of them he had the good judgment to refrain. His disinterestedness in the pursuit of knowledge and his generosity in sharing his ideas are exhibited with singular clearness when he found himself in this situation. It was then that he turned to other men, suitably equipped, to

come to his aid. His insight into problems connected with the physics and chemistry of the vitamins was in fact unusually penetrating. His prophetic vision on more than one occasion forced upon reluctant associates enthusiasm sufficient to embark on researches which, without his stimulation, would not then have been undertaken. It is a general judgment that the organic chemistry of this group of substances is richer as a result of the interest which he aroused and to which he turned as the result of his clinical experience. He knew his limitations, but he knew also how to surmount them. He not only cultivated a field but he shared its cultivation with his fellows.

This description of a singular man would be incomplete if other aspects of his personality were left unmentioned. Aside from his industry, aside from his scientific insight, aside from his inventiveness, he had an unusual historical sense. Were this side of his interests not known otherwise, it would emerge from reading those chapters in his book on rickets in which he describes the history of this disease. He cared not only for knowledge of the development of ideas in regard to it, but he charged himself with the collection of the literature of this subject and has by his collection made the Library of the New York Academy of Medicine the richer. Those who were privileged to sit with him on the Committee of that Library were aware of his sensitiveness to the meaning of the march of ideas in the development of conceptions.

He was conscious also of another obligation. As a scientific man, he made the interests of scientific men his personal concern. In this city in which social intercourse among like-minded men is difficult, he made of his home a center of hospitality, a center for the discussion and exchange of ideas. That the discussions were uniformly elevated and of a high seriousness, the character of the man amply assured.

Wherever on the numerous sides of interest appropriate to the lives of medical men one looks, the death of Alfred Hess marks loss. He touched life in many of its phases; wherever he touched it, he enriched it. Without the oppor-

tunity for disciples, his intellectual vigor, his disinterestedness, his pungent personality impressed itself upon his contemporaries.

The Harvey Society is conscious of its loss. To his associates, to his friends, to his family, it expresses its deep sympathy.

JAMES W. JOBLING
WILLIAM H. PARK
ALFRED E. COHN, *Chairman*

The following resolution upon the death of Dr. Alfred F. Hess was passed by the Committee on Library at a meeting held January 9, 1934:

The Committee on Library of The New York Academy of Medicine possessed in Doctor Alfred Fabian Hess a friend to the Library and an associate in the guidance of its activities whose comradeship they greatly valued. As a member of the Committee from 1928 to 1932, and Chairman in the last of these years, Dr. Hess' interest in the Library was constant and productive. He strengthened it as an institution and gave generously to it from his store of wisdom and of books.

The Committee wish to express to Mrs. Hess their sense of personal loss in the death of Dr. Hess.

ELI MOSCHCOWITZ,
Secretary of Committee on Library

DEATHS OF FELLOWS AND ASSOCIATE FELLOW OF THE ACADEMY

CHAPMAN, CHARLES FRANCIS, M.D., Mount Kisco, New York; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1890; elected a Fellow of the Academy January 4, 1906; died, December 26, 1933. Dr. Chapman was a Fellow of the American Medical Association and a member of the County and State Medical Societies. He was Surgeon to Northern Westchester Hospital, Mount Kisco, and President of the Westchester County Medical Society.

FRANKEN, SIGMUND WALTER ANTHONY, D.D.S., 151 Central Park West, New York City; graduated in dentistry from the New York College of Dentistry in 1909; elected an Associate Fellow of the Academy March 3, 1927; died, December 13, 1933. Dr. Franken was a member of the First District Dental Society, The New York State Dental Society, The American Dental Association, The Association for the Study of Internal Secretions, and the New York Academy of Science. Since 1920 he has been Chief of the Dental Clinic at Lenox Hill Hospital in New York City.

MOSCHCOWITZ, ALEXIS VICTOR, B.A., Ph.D., M.D., 925 Madison Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1891; elected a Fellow of the Academy April 5, 1900; died, December 21, 1933. Dr. Moschcowitz was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, the American Surgical Association, the American Association for Thoracic Surgery, the International Surgical Association, the New York Surgical Society, the Alumni Association of Lenox Hill Hospital and the Pathological Society. He was Professor of Clinical Surgery in the College of Physicians and Surgeons, Columbia University. He was Consulting Surgeon to Mount Sinai, Israel-Zion, Bronx Maternity and Woman's Hospitals. Dr. Moschcowitz served the Academy in many ways. At the time of his death he was a member of the Committee on Fellowship.

WILLIAMS, LINSLY RUDD, B.A., M.A., M.D., 130 East 67 Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1899; elected a Fellow of the Academy May 5, 1904; died, January 8, 1934. Dr. Williams was a Fellow of the American Medical Association, a member of the County and State Medical Societies and the American Public Health Association. He was Director of the National Tuberculosis Association from 1922 to 1928. He became Director of The New York Academy of Medicine in January, 1924, and President of the New York Tuberculosis and Health Association in February, 1928, and held these offices at the time of his death. He occupied many other important positions in connection with public health and the advancement of medical practice.